POREST RESEARCH REPORT



NOVA SCOTIA DEPARTMENT OF NATURAL RESOURCES

No. 65: June 1998

THE EFFICACY AND COST OF FOUR HERBICIDE PRODUCTS APPLIED USING SELECTIVE METHODS

Tim O'Brien and Bob Murray

INTRODUCTION

In a previously published report (NSDNR #58, 1995) the productivity of four selective herbicide application methods was compared. These methods included applying (i) Release®1 or Vision®2 to the foliage, (ii) Velpar®L³ to the ground, (iii) Weedone®4 or Release® directly on one side of the bark of the target competition or iv) Weedone® on both sides of the bark of the target competition.

Applications of Weedone® and Release® to the bark allow selective targeting and can be used during the late fall and winter, thereby expanding the traditional "application window" for vegetation control. The bark and ground methods have possible advantages when competition consists of taller sprouts that are difficult to reach using foliar applications from the ground.

This report completes the study and compares the relative costs and effectiveness of these products and treatments in control-ling maple sprout competition.

METHODS

Four herbicide products were used in this study, Release®, Vision®, Weedone® and Velpar®L®. The products were applied using different methods, rates of concentration and carrier agents: diesel oil (D), mineral oil (M) and water (Table 1). Refer to FRR #58 for details of application methods used in this trial.

Five sites were chosen for this study (Figure 1, Table 2). Four of the five were clearcuts (Glencoe, Cameron Settlement, Big Marsh and Sucker Lake) with either predominantly red maple (Acer rubrum L.) or sugar maple (Acer soccharum Marsh) competition. The fifth site, Frog Lake, originated from a shelterwood treatment that had received a final cut in 1990. The main competition at this site was sugar maple. The sites were treated between 1992 and 1994; Glencoe in 1992, Big Marsh, Cameron Settlement and Frog Lake in 1993 and Sucker Lake in 1994 (Table 2).

At each site, 7 blocks were established of which 6 were treated and one was left untreated as a control. Treatments were randomly assigned to blocks. Not all treatments were performed at each site. Spraying was carried out using a back pack sprayer for the Streamline, Foliar and Low Volume applications whereas, a Spot Gun was used for Ground applications.

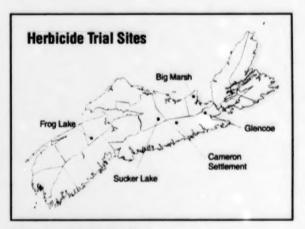


Figure 1. Herbicide Trial Sites

Prior to and following spraying, the average height (H) and percentage of ground covered by maple clumps (C) were measured. Percent ground cover was determined by establishing 10, 1.8 metre radius plots in each block prior to spraying. The plots were established as close as possible to the centre of a maple clump. Ground cover was estimated by determining the percentage of the plot covered by the foliage of the sprouts. Height and ground cover were then combined to form a competition index:

where: CI = H x C

CI = Competition Index

H = Average height (metres) of maple sprouts

C = Percentage of ground covered by the sprouts

The CI, height and percent cover were averaged over all plots treated with a given rate and method by site. The average CI was used to represent the effect of the treatment on maple sprouts.

3 Verpar's, Pregistered trademark of Du Pont Canada Inc.
4 Wendowell Trademark of Disease Du Jane Nadadatast D.

¹ Release® Trademark of DowElance

² Vision® Silvicultural Herbicide is a registered trademark of the Monsanto Company, USA.

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Table 1. A listing of products by method of application.

| Product | Hathod' | Amount of Product | Carrier | Stee | Blocks Treated |
|--|----------------------|-------------------------|----------------------------|------|-------------------|
| Release* | Streamline | 20%, 30% | Diesel & Mineral oil | 8 | 12 |
| | Foliar | 3%, 5% | Water | 4 | 5 |
| /Islon [®] /alpar [®] L Veedons [®] | Foliar | 2%, 3%, 5% | Water | • | 8 |
| Velpar*L | Ground | 1.5, 2.5m ³ | None | 3 | 3 |
| | Low volume 1-side | 100% | Pre- mixed solution | • | ' |
| | Low volume 2-side | 100% | Pre- mixed solution | ì | 3 |

¹ For a detailed description of application methods refer to FRR #SB.

¹ 1.5 and 2.5 ml of undiluted product were applied per cm of stump diamet

RESULTS & DISCUSSION

PRODUCT EFFICACY

The efficacy results of the four herbicide products tested in this study are discussed individually by product. Presented in Figures 2a, b and c is Ci versus time by treatment for each site. In order to simplify the presentation of these results, only the two most promising treatments in terms of efficacy; Release® and Vision® are presented in Figure 2. A complete listing of Height, Percent Ground Cover and CI for all treatments are found in Appendix I.

Release*

Release* was equally effective at both the 20% and 30% concentrations when mixed with diesel or mineral oil and applied using the Streamline method (Figure 2a, b, c; Appendix I). Two year results at sites where both rates were applied (Big Marsh, Cameron Settlement) indicate competition was all but eliminated the first year following spraying and remained in check the second year (Figure 2a). Sugar Maple was effectively controlled for two years at Frog Lake with the 20% Release rate (Figure 2c). Three year results with Release at Glencoe (red maple) also showed good control. CI for the 30% rate dropped from a pretreatment level of 60.8 (1.5 m tall, 39.5% ground coverage) to 0.3 (0.3 m tall, 2.9% ground coverage) in year three.

Carrier agents used with Release® did not affect post treatment competition levels where diesel or mineral oil was applied in equal concentrations (Figure 2a,b,c).

Foliar treatments of Release® were only effective in reducing maple competition the first year after treatment. Resprouting was observed at each of the locations where two year assessments were performed (Big Marsh, Glencoe, Cameron Settlement)(Figure 2a,b). By year two, the CI on foliar treated blocks at Big Marsh averaged 30.7 compared to a Ci of 1.2 for the 20% Streamline treatment (Appendix I). Similar results were also observed at Cameron Settlement (Figure 2a).

Vision*

At each of the four locations where Vision®-Foliar treatments were tested (Glencoe, Cameron Settlement, Big Marsh and Sucker Lake)

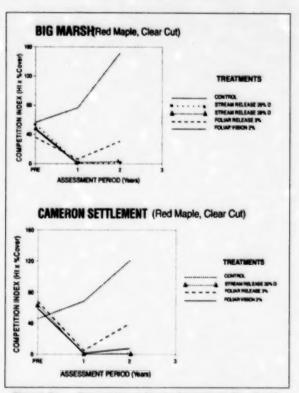


Figure 2a. Competition index by Assessment Period and treatment for Big Marsh and Cameron Settlement (only the most promising treatments in terms of efficacy and cost are presented).

competition levels were reduced the first year following treatment and remained in check for two years; three years at Glencoe (Figure 2a,b). For example, at Glencoe the CI for the 2% treatment had declined from 62.8 prior to treatment (1.4 m tall, 46% ground coverage) to 1.5 in year three (0.37 m tall and 4% ground coverage) compared to the untreated block which averaged 88.5 (1.67 m tall, 53% ground coverage).

Velpar*L

Competition control results with Velpar®L were mixed, as control varied depending on the site and the rate at which the chemical was applied. Excellent control was achieved in Glencoe at the 1.5 ml rate three years following treatment (0.3 m tall and 3.6% ground coverage; pretreatment Cl=62.9) however, at Big Marsh with the same rate the results were poor; with resprouting occurring in the second year (Cl=22.3; 1.7 m tall, 20.5% ground cover)(Appendix I).

At Cameron Settlement, the 2.5 ml Velpar®L rate achieved good control for two years after treatment. The Cl in year two for 2.5 ml Velpar®L was 7.2 (0.7 m tall, covering 10% of the ground) compared to the Cl for the control block in year two at 120.8 (2.3 m tall, covering 53% of the ground).

Weedone*

Control with Weedone® produced mixed results in this trial. Weedone achieved good control of sprouting for one year on all sites, however, vigorous resprouting occurred in the second year at two

Table 2. Pre-treatment site conditions by location.

| Location | Previous Treatment | Date | Date | Area | Average Block Size | | | Site Condition | - | |
|---------------------|-----------------------|---------|------|-------|-----------------------|------------------------|-----------------------|------------------|--------------|-------------------------------|
| | | | | (liu) | (fm) | Development Species | Height of Sprouts (m) | Sharra Chumpi | Sharps Hh | Compatition Index (CI)* |
| Big Marsh | Clear Cut | 1991 | 1993 | 1.2 | 0.20 | Red Maple | 1.44 | 33 | 1088 | 44.5 |
| Carneron Settlement | Cher Cut | 1991 | 1993 | 1.3 | 0.21 | Red Maple | 1.33 | 23 | 291 | 52.1 |
| Gencoe | Cher Cut | 1991 | 1992 | 1.7 | 0.34 | Red Maple | 1.44 | 10 | 1410 | 57.5 |
| Sucker Lake | Cher Cut | 1992 | 1994 | 1.1 | 0.18 | Sugar Maple | 1.58 | 14 | 383 | 32.0 |
| Frog Lake | Shelterwood | 1980-90 | 1993 | 9.9 | 1.65 | Sugar Maple | 3.0-6.0" | 10 | 890 | ND' |

On average each treated clump was made up of 2 stumps.

The average Competion Index (CI) for the site prior to treatment. CI is determined by multiplying the height of the maple sprouts (m) by the percent ground cover (%).

The stand was harvested over a 10 year period with the final out occurring in 1990.

⁵ The precreatment CI could not be determined as the percent ground cover was not recorded prior to treatment.

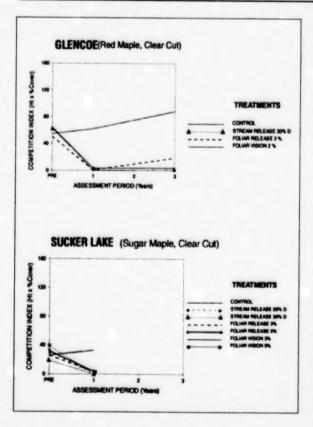


Figure 2b. Competition Index by Assessment Period and treatment for Glencoe and Sucker Lake (only the most promising treatments in terms of efficacy and cost are presented).

locations. Two year results at Cameron Settlement with the Low Volume 1-sided treatment indicate that Weedone® was unable to control maple sprouting at this site. Post-treatment (50.6) CI for Weedone® was higher than the pretreatment CI (45.2) in the second year (Appendix I).

In contrast, results at Glencoe with the Low Volume 2-Sided treatment indicated good control of maple sprouting. One year after treatment competition levels showed a sharp decline (CI=0.7; 0.5 m tall; 1.3% ground coverage) from the pretreatment CI of 53.5 and, by year three, the CI (17.6) was still low in comparison to the Control CI of 88.5 (Appendix I).

COSTS

Costs for each treatment-product combination tested in this trial are presented in Appendix II. The following should be considered in interpreting the results (1) non-productive time is approximately 10% and (2) extra care was used in applying the chemical to the target competition in order to minimize the volume of chemical used.

Predicted costs were directly related to the density of treated stumps per hectare. The two most promising treatments in terms of

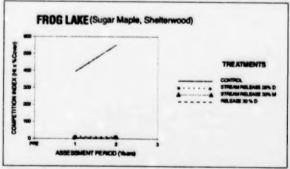


Figure 2c. Competition Index by Assessment Period and treatment for Frog Lake (only the most promising treatments in terms of efficacy and cost are presented).

Table 1. A listing of products by method of application.

| Product | Method' | Amount of Product | Carrier | Sites | Blocks Treated |
|---------------------|----------------------|-------------------------|----------------------------|-------|-------------------|
| Release* | Streamline | 20%, 30% | Dieset & Mineral oil | 5 | 12 |
| | Foliar | 3%, 5% | Water | 4 | 5 |
| Vision* | Foliar | 2%, 3%, 5% | Water | 4 | 5 |
| | Ground | 1.5, 2.5m ³ | None | 3 | 3 |
| elpar®L Veedone® | Low volume 1-side | 100% | Pre- mixed solution | 1 | 1 |
| | Low volume 2-side | 100% | Pre- mixed solution | 3 | 3 |

¹ For a detailed description of application methods refer to FRR #58.
² 1.5 and 2.5 ml of undiluted product were applied per cm of stump diamete

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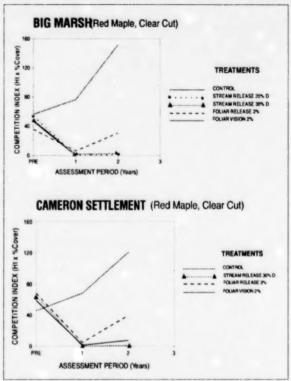


Figure 2a. Competition index by Assessment Period and treatment for Big Marsh and Cameron Settlement (only the most promising treatments in terms of efficacy and cost are presented).

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| Location | Previous | Date | Date | Area | Average | | | Site Condition | 278 | |
|---------------------|-------------|-----------|---------|------|--------------------|---------------------|--------------------------------|----------------|--------------|---|
| | Treatment | Harvested | Treated | (ha) | Block Size (hu) | Dominant Species | Height of Sprouts (m) | Stems Clump | Shamps Ha | Competition Index (CI) ⁹ |
| Big Marsh | Clear Cut | 1991 | 1993 | 1.2 | 0.20 | Red Maple | 1.44 | 33 | 1088 | 44.5 |
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³ The average Competion Index (CI) for the site prior to treatment. CI is determined by multiplying the height of the maple sprouts (m) by the percent ground cover (%).

³ The stand was harvested over a 10 year period with the final cut occurring in 1990.

Visual estimate.

⁵ The pretreatment CI could not be determined as the percent ground cover was not recorded prior to treatment.

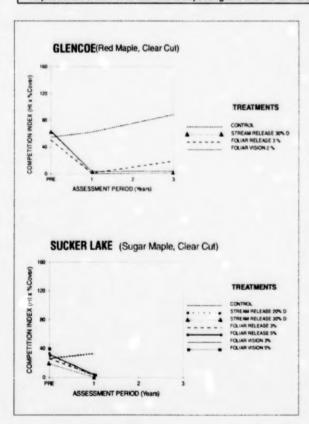


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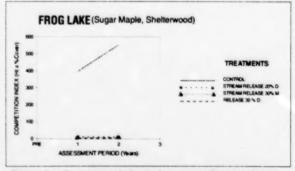


Figure 2c. Competition Index by Assessment Period and treatment for Frog Lake (only the most promising treatments in terms of efficacy and cost are presented).



efficacy and cost, Release* 20% diesel Streamline and Vision* 2%-Foliar, are discussed in detail.

Chemical Costs

Product costs (\$/litre) at 1995 prices are as follows: Release* \$22.23, Vision* \$14, Velpar*L \$19.75 and Weedone* \$13. Carrier agent prices were \$0.56/litre for diesel oil and \$1.35/litre for mineral oil.

The key factors in determining the chemical costs for each treatment were product price (\$/litre), rate of application (ml/stump) and carrier (diesel or mineral oil versus water). Release* was more expensive per litre, but even with lower chemical requirements per

stump 3.8 ml compared to 4.8 ml/stump for Vision®, resulted in higher chemical costs per treated stump. Release® costs per stump were 8.5 cents compared to 6.7 cents for Vision® (Appendix II).

Diesel oil used with Release® added approximately \$0.09/litre or 9.1% of the total chemical cost. No petroleum carriers were required for Vision®. Overall, Release® costs to treat 600 stumps/ha were \$16 more per ha compared to Vision® despite using less chemical per treated stump (Table 3).

Total treatment costs for the 20% Streamline Release® were \$11/ ha lower than 2% Foliar®-Vision® treatments (\$107/ha for Release® versus \$118/ha for Vision®) at 600 stumps/ha.

Table 3. A comparison of total treatment costs ¹ for the Streamline Release * 20% (diesel) and Foliar 2% Vision * treatments by density of treated stumps.

| Density ² | L | abour Costs (\$/ha) | • | CI | (\$/ha) | ts* | Total T | reatment C (\$/ha) | osts ⁵ |
|----------------------|-----------------------|---------------------------|-----------------------|------------------------|---------------|-----------------------|-------------------------|-----------------------|----------------------------|
| (stumps/ha) | Release * 20% diesel* | Vision ^e 2% | Difference (\$/ha) | Release® 20% diesel | Vision* 2% | Difference (\$/ha) | Release * 20% diesel | Vision * 2% | Difference e (\$/ha) |
| 200 | 34 | 51 | -18 | 19 | 13 | +5 | 52 | 65 | -13 |
| 400 | 44 | 67 | -23 | 37 | 27 | +11 | 81 | 94 | -13 |
| 600 | 51 | 78 | -27 | 56 | 40 | +16 | 107 | 118 | -11 |
| 800 | 56 | 87 | -31 | 75 | 53 | +21 | 131 | 140 | -9 |
| 1000 | 61 | 95 | -33 | 93 | 67 | +27 | 155 | 161 | -7 |

¹ Treatment costs were determined by the Planning & Research Section and may not represent actual operating costs.

MANAGEMENT RECOMMENDATION

Early results indicate Streamline applications of Release® (20% and 30% concentrations mixed with diesel or mineral oil) and Foliar applications of Vision® (2%) were effective in controlling red maple sprouts up to 2 years following treatment. Release® applications may be preferred if treatment during the late fall or winter is necessary or when the foliage of the competing trees is difficult to reach.

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DISCLAIMER

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² On average each treated dump was made up of 2 stumps.

Predicted labour values are based on application technique and were derived in NSDNR #58 (1995). An hourly labour wage of \$15/hour was assumed.

⁴ Based on total chemical costs including carrier costs as shown in Appendix II.

⁵ Total Treatment Costs = Labour + Chemical Costs.

^{*} Release* applied at 20% concentration mixed with diesel oil.

⁷ Vision® applied at 2% concentration mixed with water.

efficacy and cost, Release® 20% diesel Streamline and Vision® 2%-Foliar, are discussed in detail.

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|----------------------|--------------------------|----------------|-----------------------|------------------------|---------------|-----------------------|-------------------------|-----------------------|-----------------------|
| (stum ps/ha) | Release * 20% diesel* | Vision® 2%² | Difference (\$/ha) | Release* 20% diesel | Vision® 2% | Difference (\$/ha) | Release * 20% diesel | Vision * 2% | Difference (\$/ha) |
| 200 | 34 | 51 | -18 | 19 | 13 | +5 | 52 | 65 | -13 |
| 400 | 44 | 67 | -23 | 37 | 27 | +11 | 81 | 94 | -13 |
| 600 | 51 | 78 | -27 | 56 | 40 | +16 | 107 | 118 | -11 |
| 800 | 56 | 87 | -31 | 75 | 53 | +21 | 131 | 140 | -9 |
| 1000 | 61 | 95 | -33 | 93 | 67 | +27 | 155 | 161 | -7 |

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⁵ Total Treatment Costs = Labour + Chemical Costs.

^{*} Release* applied at 20% concentration mixed with diesel oil.

⁷ Vision® applied at 2% concentration mixed with water.

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| | TANGET | TREATMENT | SPRAY | BLOCK | PRODUCT | AMOUNT | MUX | | PRE | | | - | | | | | | - | |
| | | | | | | PRODUCT | | arc | # | 5 | Q, Cv | Ŧ | 5 | Or Cv | £ | 5 | 40.00 | ž | 0 |
| | Red Maple | Streemline 1-side | 031183 | - | Referee | 20% | deset | 37.8 | 1.44 | 54.0 | 0.9 | 0.16 | 0.1 | 1.9 | 0.61 | 1.2 | | | |
| | | Streamline 1-side | 031193 | | Referen | 30% | dissel | 33.6 | 1.40 | # | 979 | 0.24 | 0.2 | 3.0 | 0.42 | 1.3 | | | |
| | | Follar | 130963 | * | Vision | Z. | veller | 28.0 | 1.64 | 18.5 | 9.6 | 0.15 | 0.1 | 1.8 | 0.20 | 6.9 | | | |
| | | Foller | 031193 | • | Rolesse | K | waller | 28.2 | 1.42 | 38.8 | 9.0 | 0.68 | 6.1 | 18.7 | 1.56 | 30.7 | | , D | |
| | | Low volume 2-side | 031183 | | Weedons | 100% | MIL | 0.85 | 1.43 | 41.6 | 12.7 | 0.81 | 11.6 | 22.6 | 1.62 | 38.6 | | | |
| | | Ground | 280683 | - | Velpart | 1.6 ml | NIL | 23.1 | 1.33 | 30.7 | 18.0 | 1.24 | 22.3 | 20.6 | 1.73 | 38.8 | | | |
| | | CONTROL | | • | | | | 39.0 | 1.48 | 888 | 44.5 | 1.72 | 78.6 | 67.0 | 2.66 | 161.6 | | | |
| т | Red Maple | Streamline 1-side | 061183 | - | Rotosse | 30% | Speed | 38.0 | 1.00 | 64.2 | 1.0 | 0.16 | 0.3 | 2.7 | 0.33 | 0.0 | | | |
| Settlement | | Follar | 120863 | ~ | Vision | r. | vater | 38.6 | 1.62 | 1789 | 3.8 | 0.33 | 2 | 10.7 | 0.70 | 7.6 | | | |
| (Clearout) | | Foller | 120993 | | Reissof | K | and an | 42.8 | 1.60 | 68.0 | 8.0 | 9.64 | 5 | 28.8 | 1.38 | 38.7 | | | |
| | | Low volume 1-side | 081193 | | Weedone | 100% | ¥ | 29.0 | 1.66 | 46.2 | 12.0 | 1.42 | 17.0 | 30.1 | 1.68 | 80.6 | | ! | |
| | | Low volume 2-side | 081193 | • | Weedons | 100% | NIL | 38.3 | 1.62 | 63.7 | 3.7 | 970 | 1.6 | 14.0 | 0.87 | 13.6 | | 9 | |
| | | Greund | 280693 | - | Velpar'L | 2.5 mi | M | 21.8 | 1.33 | 28.0 | 14.0 | 0.63 | 11.6 | 9.7 | 0.74 | 7.2 | | | |
| | | CONTROL | | 1 | | | | 31.6 | 1.46 | 46.7 | 38.6 | 1.77 | 68.2 | 62.6 | 2.30 | 120.8 | | | ١ |
| Glencoe | Red Maple | Streamline 1-eide | 031192 | - | Refesse | 30% | dissel | 38.6 | 1.54 | 8.08 | 0.2 | 0.04 | 0.0 | | | | 57 | 0.30 | 0.3 |
| | | Follar | 160992 | 1 | Vision | K | water | 48.5 | 128 | 62.8 | 1.1 | 0.25 | 0.0 | | | | 6.0 | 0.37 | - |
| · · | | Follar | 180992 | | Reissas | K | valler | 34.0 | 1.48 | 60.3 | 3.1 | 0.25 | 870 | | Q | | 17.8 | 1.06 | 18.7 |
| | | Low volume 2-side | 031182 | • | Weedone | 100% | ¥ | 38.6 | 1.30 | 63.6 | 2 | 0.82 | 0.7 | | | | 18.6 | 0.9 | 17.8 |
| | | Ground | 180892 | • | Velper | 1.5 mil | M. | 44.0 | 1.43 | 62.9 | 23.0 | 1.48 | 34.5 | | | | 3.6 | 0.31 | - |
| | | CONTROL | | • | | | | 39.0 | 1.40 | 84.8 | 42.0 | 1.48 | 62.2 | | | | 63.0 | 1.67 | 1 |
| Sucher Lake | Sugar | Streamline 1-side | 031184 | - | Release | 20% | Gessel | 18.9 | 1.67 | 31.6 | 0.1 | 90'0 | 0.0 | | | | | | |
| _ | Maple | Streamline 1-aide | 031184 | | Raines | 30% | desei | 13.6 | 1.30 | 18.9 | 9.1 | 0.10 | 00 | | | | | | |
| | | Follar | 310884 | - | Vision | * | water | 27.8 | 1.86 | 61.2 | 3 | 0.62 | 7 | | | | | 1 | |
| | | Follar | 070884 | * | Release | K | water | 18.9 | 1.37 | 26.9 | : | 0.60 | 2 | | Q | | | 2 | |
| | | Foller | 310894 | • | Vision*L | ž | water | 22.6 | 1.71 | 38.5 | 0.7 | 0.13 | 9.2 | | | | | | |
| | | Follar | 070994 | • | Release | É | water | 18.9 | 1.68 | 31.9 | : | 0.62 | 2 | | | | | | |
| | | CONTROL | | 1 | | , | | 18.6 | 1.40 | 28.0 | 18.0 | 1.73 | 32.9 | | | 1 | | | 1 |
| Frog Lake | Sugar | Streamline 1-side | 221183 | - | Reisase | 20% | desei | | | | ** | | 3 | 2 | | 3 | | | |
| (Shefterwood) | Maple | Streamline 1-side | 221193 | 4 | Refessor | ** | 9 | | | | 1.7 | 1.41 | 3.7 | 3 | 0.0 | 3.7 | | | |
| | | Streemline 1-side | 221183 | • | Raises | 30% | diesel | | | | 6.1 | 0.03 | 0.1 | 0.7 | 0.19 | 0.7 | | | |
| | | Streamline 1-side | 221193 | • | Release | 30% | mineral | | ã | | 1.4 | 1.8 | 3.3 | 2 | 0.80 | 22 | | 2 | |
| | | Streamline 1-side | 221183 | - | Raises | 30% | dissell | | | | 0.0 | 0.68 | 3 | 2.0 | 0.76 | 2.7 | | | |
| | | Strambre 1-4ide | 221193 | ** | Release | 30% | mineral | | | | 1.1 | 0.96 | 2 | 0.0 | 0.0 | 0.0 | | | |
| | | - | | | | ٠ | ٠ | | | | 72.0 | 3 | 38.6 | 124 | 6.7 | 862.8 | | | |

index (CI) determined by multiplying the percentage of the ground covered by the sprusts (GRCV) by the average height (HT) of the atomp sprusted (ND)

| | | | ACTUAL & PREDICTED TREATMENT COSTS | PREDICTED | APP TREATME | | BY METHOD AND PRODUCT | OD AN | PROD | UCT | | |
|----------------------|----------|--------|------------------------------------|---------------------|------------------|--------------------|-----------------------|----------------|-------|---------------|---------------|------------|
| | | | | | | | | | | Costs | | |
| Method | Product | Kate | Mix. | Number of Blocks | Stumps (#/ha) | Product Applied | 0 | Chemical | | Labour | Total | |
| | | | | (#) | | (ml/stump) | (ceu | (cents/tstump) | (d | (cents/stump) | Actual | Predicted* |
| | | | | | | | Product | Mix | Total | | (cents/stump) | (\$/ha) |
| Streamline | Release | 20% | Diesel Oil | 4 | 826 | 3.80 | 8.49 | 0.85 | 9.34 | 7.5 | 16.84 | 101 |
| anic-i | | 30% | Diesel Oil | 9 | 868 | 5.82 | 13.01 | 0.76 | 13.77 | 7.3 | 21.07 | 126 |
| | | 30% | Mineral Oil | 2 | 920 | 6.74 | 15.06 | 2.12 | 17.18 | 7.0 | 24.18 | 145 |
| Low Volume 1-side | Weedone® | | Pre-mixed | 1 | 274 | 25.00 | 32.50 | 0 | 32.50 | 14.0 | 46.50 | 279 |
| Low Volume 2-side | Weedone® | | Pre-mixed | 3 | 731 | 42.12 | 54.80 | 0 | 54.80 | 15.3 | 70.10 | 421 |
| Foliar | Release | 3% | Water | 4 | 704 | 5.28 | 11.80 | 0 | 11.80 | 13.3 | 25.10 | 151 |
| | | 2% | Water | - | 419 | 7.16 | 16.00 | 0 | 16.00 | 11.0 | 27.00 | 162 |
| | Vision | 2% | Water | 3 | 864 | 4.77 | 89.9 | 0 | 89.9 | 13.3 | 19.98 | 120 |
| | | 3% | Water | - | 438 | 7.50 | 10.50 | 0 | 10.50 | 19.0 | 29.50 | 111 |
| | | 2% | Water | - | 377 | 13.26 | 18.56 | 0 | 18.56 | 18.0 | 36.56 | 219 |
| Ground | VelpareL | 1.5 ml | Undiluted | 2 | 1571 | 12.28 | 24.25 | 0 | 24.25 | 7.0 | 31.25 | 188 |
| | | 2.5 ml | Undiluted | - | 181 | 29.17 | 19.75 | 0 | 19.75 | 0.61 | 76.61 | 460 |
| | | ١ | ١ | | l | | | ١ | 1 | | | |

The 1995 chemical prices (\$/litre) used in this study are Release 22.35; Vision 14.00; Weedone 13.00; Velpar L 19.75.
 The price of mixing agents was \$0.56 /litre for diesel oil and \$1.35/litre for mineral oil.
 Labour costs were based on a wage rate of \$15/hour, and productivity of work performed by Planning and Research Staff.
 Based on treating 600 stumps.

| 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, | Mathematic Mat | | | | | | | | | | | | | | | | | | | | |
|--|--|------------|-----------|-------------------|--------|-------|------------|---------|---------|------|------|------|------|---------|------------|---------------|--------|-------|------|------|------|
| Marie Mari | Diff. Cont. Product Co | LOCATION & | _ | | 3 | | | | | | | | | ASSESSA | HENTS (ven | Ta affac from | 1 | | | | - |
| Control Cont | verificatividades 011131 1 Respect 200 H GF GF H GF GF H GF GF GF H GF GF GF GF GF GF GF< | METHOD | _ | | DATE | BLOCK | PRODUCT | PRODUCT | XIII | | PRE | | | - | | | (ment) | | | | |
| | Table Tabl | Big Marsh | Red Manie | _ | | | | 2000 | | gro | Ŧ | ъ | 8 | 1 | 1 | | | | | - | |
| Markatania (1988) 1988 1 | Foliary Control Cont | (Planter) | | | 031193 | 1 | Release | 20% | diesei | 3.0 | 1 | | 5 | E | 5 | 800 | Ĭ | 5 | S.C. | Ŧ | 0 |
| Frience Frience Friend | | (nestent) | | Streamline 1-side | 031193 | • | Release | 30% | disease | | | 0.75 | 6.0 | 0.15 | 0.1 | 1.9 | 0.61 | 12 | | | |
| Friend F | Council Coun | | | Foliar | 130993 | 2 | Vision | | | 57.5 | 1.40 | 6.9 | 8.0 | 0.24 | 0.2 | 3.0 | 0.42 | : | | | |
| Mail Name Common Common | Control 2,000 1, | | | Foliar | 031193 | * | Release | 5 ; | water | 28.0 | 1.5 | 45.9 | 9.0 | 0.15 | 0.1 | 1.6 | 0 30 | 3 ; | | | |
| Mail of the control | Optioned 20083 1 Velocit 1587 HILL 23.0 15.0 | | | Low volume 2-side | 031193 | • | | 5 | water | 28.2 | 1.42 | 35.8 | 9.0 | 0.68 | | : | | 200 | | | |
| Marie COUTION State St | Foliar 15983 2 Voliar 1588 1882 1883 | | | Ground | 280893 | | - COOL | 100% | NIL | 29.0 | 1.43 | 41.5 | 12.7 | 0.91 | | | 1.56 | 30.7 | | Š | |
| | Foliar 10093 2 Nebesser 35% Grees 35% Gree | | | CONTROL | | | Veipar | 1.5 m | NIE. | 23.1 | 1.33 | 30.7 | 18.0 | 1.24 | 33.3 | 2 2 | 1.62 | 36.5 | | | |
| Figure County C | Foliar 150993 2 Wilson 250 Wilson 250 | Cameron | Red Maple | Streamline 1-side | 081193 | | | | | 39.0 | 1.48 | 56.6 | 44.5 | 1.72 | 78.6 | 200 | 27. | 38.8 | | | |
| Foliar F | Foliar 120993 | | | Follar | 120883 | | | 30% | diesel | 38.0 | 1.69 | 64.2 | 1.0 | 0.16 | 00 | 2 | 7.66 | 151.6 | | | |
| Covariant state 2019 Covariant state 2 | Optimize 1-side 051153 4 Missesser 35 water 45 150 654 45 150 654 45 150 654 45 150 150 150 654 45 170 | Clearcut) | | Foliar | 120061 | | Vision | ž. | water | 36.5 | 1.62 | 1.69 | 3.8 | 0.33 | : | 17 | 0.33 | 0.9 | | | |
| Convoluent 2-side Conv | March Marc | | | Low volume 1-side | | , | Release | K | water | 42.5 | 1.60 | 68.0 | 0 | | 3 ; | 10.7 | 0.70 | 7.5 | | | |
| Courties Courties | Occupant 386883 1 Velgart 2.5 mile 15.2 </td <td></td> <td></td> <td>Low volume 2-side</td> <td>20100</td> <td>•</td> <td>Weedone</td> <td>100%</td> <td>MIL</td> <td>29.0</td> <td>1.56</td> <td>46.2</td> <td>12.0</td> <td></td> <td>3</td> <td>28.6</td> <td>1.38</td> <td>39.7</td> <td></td> <td></td> <td></td> | | | Low volume 2-side | 20100 | • | Weedone | 100% | MIL | 29.0 | 1.56 | 46.2 | 12.0 | | 3 | 28.6 | 1.38 | 39.7 | | | |
| CONTINGL CONTINGL Court Court | | | | Ground | | • | Weedone" | 100% | MIL | 36.3 | 1.52 | 53.7 | 3.7 | | 9.71 | 10.1 | 1.68 | 9709 | | | |
| Neet Name Foilar 1000-12 7 Network 200, disease 200, | Mainter fulfile 151192 2 Release 30% Glesse 315 146 457 315 147 642 525 230 1308 1 | | | CONTROL | 18097 | - | Velparit | 2.5 mi | NIL | 21.8 | 1.33 | 29.0 | | | 9. | 14.0 | 0.97 | 13.6 | | Q | |
| Foliar 1608e | Foliar 16082 7 Vision 75 water 45.5 154 96.3 0.2 0.0 0.0 | Jencoe | Red Manie | Channellan | | - | | | | 31.5 | 1.46 | | | 20.0 | 11.6 | 8.7 | 0.74 | 7.2 | | | |
| Foliar F | Foliar 160892 7 Vision 25 Water 246 1.38 623 0.04 0.00 | Searces! | | apie-1 auminano | 031192 | ~ | Release | 30% | diesel | 39.6 | 77 | | 26.0 | 1.71 | 68.2 | 52.5 | 2.30 | 120.8 | | | |
| CONTROL 16084 15084 1 10084 1 1 1 1 1 1 1 1 1 | | | | rollar | 160992 | 1 | Vision | K | water | 46.6 | | 2 | 2.0 | 0.04 | 0.0 | | | | 2.9 | 0.30 | 0.3 |
| Count 15082 Statemine 1-aide 031192 Statemine 1- | Street | | | Foliar | 160992 | | Release | * | | | 20 | 873 | 1.1 | 0.25 | 0.0 | | | | | | |
| Courtie Cour | State 150822 5 Velpar 1.5ml NIL 38.5 1.39 63.5 1.5 0.52 0.7 NID NIL NIL 38.5 1.39 63.5 1.49 0.22 34.3 NID NIL NIL | | | | 031192 | • | Wesdone | **** | - Aller | 34.0 | 1.48 | 50.3 | 3.1 | 0.25 | 8.0 | | | | | 0.37 | |
| Stager Streamline 1-side 0.31194 6 Releaser 20% diese 15.0 140 145 623 130 149 623 149 149 623 149 | DNTROL 4.0 1.4.0 1.4.0 1.4.0 1.4.0 1.4.0 1.4.0 1.4.0 1.4.0 5.1.0 1.4.0 5.1.0 1.4.0 5.1.0 1.4.0 5.1.0 1.4.0 6.1.0 0.1.0 0.0.0 | | | | 150692 | 40 | Veins | 200 | į. | 38.6 | 1.39 | 63.6 | 1.3 | 0.52 | 0.7 | | ND | | 871 | 20. | 18.7 |
| Supprocesses Streamline 1-side Streamlin | Milne 1-side 031594 6 Releaser 20% diesei 15.9 1.67 31.6 0.1 0.06 0.0 0.0 | 1 | | CONTROL | | | | 1.5 ml | ď | 44.0 | 1.43 | 62.9 | 23.0 | | 34.3 | | | | 16.6 | 0.96 | 17.6 |
| Streamline 1-side 03184 5 Release 20% Glesse 15.8 16.7 31.8 0.1 0.06 0.0 | Foliar 11084 5 Releaser 20% diese 15,9 16,7 31,6 0.1 0.06 0.0 | ker Lake | Sugar | | 031194 | | Belesso | | + | 39.0 | 1.40 | 54.6 | 42.0 | 1.48 | 62.2 | | | _ | 3.6 | 0.31 | 1.1 |
| Foliar 310894 1 Visior 37% diesei 138 138 18.9 0.1 0.10 0.0 Foliar 510894 2 Release 3% water 18.9 1.37 28.9 6.5 0.52 2.2 Foliar 510894 2 Release 5% water 18.9 1.37 28.9 6.5 0.52 2.2 CONTROL | Foliar 310894 1 Vision 375 diesel 1.39 18.9 0.1 0.10 0.0 Foliar 310894 2 Releaser 3% water 27.5 1.89 61.2 4.2 0.52 2.2 Foliar 310894 3 Vision*L 9% water 22.5 1.71 38.5 6.5 0.80 3.3 ND Foliar 310894 4 Releaser 9% water 22.5 1.71 38.5 6.5 0.80 3.3 ND Iline 1-side 221193 4 Releaser 20% diesel 1.40 28.0 1.94 4.0 8.5 0.86 Iline 1-side 221193 4 Releaser 30% diesel 1.00 28.0 1.14 1.81 3.7 4.4 0.84 Iline 1-side 221193 4 Releaser 30% diesel 1.14 1.81 3.7 4.4 0.84 <tr< td=""><td>sercut)</td><td>1</td><td></td><td>031194</td><td>10</td><td></td><td>50%</td><td>dieset</td><td>18.9</td><td>1.67</td><td>31.6</td><td>0.1</td><td>90.0</td><td>0.0</td><td></td><td></td><td>†</td><td>070</td><td>1.67</td><td>1</td></tr<> | sercut) | 1 | | 031194 | 10 | | 50% | dieset | 18.9 | 1.67 | 31.6 | 0.1 | 90.0 | 0.0 | | | † | 070 | 1.67 | 1 |
| Foliar C70964 2 Releaser 3% water 18,9 1,37 28,9 6.5 0.50 3.3 ND | Foliar O70994 2 Releaser 3% water 27.5 1.86 61.2 4.2 0.52 2.2 Foliar 310884 3 Vision*L 9% water 22.5 1.71 38.5 6.5 0.50 3.3 ND Foliar 070994 4 Releaser 9% water 22.5 1.71 38.5 6.5 0.50 3.3 ND HIPPOL 27193 5 Releaser 20% diesei 1.69 31.9 6.5 0.50 3.4 A.4 0.84 Hire 1-side 221193 7 Releaser 20% diesei 1.69 3.0 1.73 3.7 4.4 0.84 Hire 1-side 221193 7 Releaser 30% diesei ND 1.7 1.41 3.7 4.4 0.84 Hire 1-side 221193 3 Releaser 30% diesei ND 1.4 1.81 3.3 0.39 | | | | 310894 | | | 200 | Slessel | 13.6 | 1.39 | 18.9 | 0.1 | 0.10 | 0.0 | | | | | | |
| Foliar 10084 3 Wildort 5% water 18.9 1.37 28.9 6.5 0.50 3.3 ND | foliar 310884 3 Vision*L 5% water 127 25.9 6.5 0.50 3.3 ND Foliar 070984 4 Release* 5% water 22.5 1.71 34.5 6.5 0.50 3.3 ND NTROL 7 Release* 5% water 18.6 1.40 26.0 19.0 1.73 32.9 Iline 1-aide 221193 7 Release* 20% diesei 1.69 3.6 1.53 3.7 4.4 0.84 Iline 1-aide 221193 7 Release* 30% diesei ND 1.7 1.41 3.7 4.4 0.84 Iline 1-aide 221193 4 Release* 30% mineral ND 1.4 1.81 3.7 4.4 0.84 Iline 1-aide 221193 2 Release* 30% mineral ND 1.4 1.81 3.3 0.39 0.7 0.19 IROL< | | | | 070994 | | | r. | - | 27.5 | 1.86 | 51.2 | 4.2 | 0.52 | 2.2 | | | | | | |
| Foliar Total Tot | Collar 070894 4 Releaser 9% water 22.5 1.71 38.5 0.7 0.23 0.2 0.7 NTROL 7 releaser 9% water 18.9 1.40 28.0 18.0 1.73 32.9 Hilter 1-side 227193 5 Releaser 20% diesel 1.40 28.0 1.73 32.9 4.4 0.89 Hine 1-side 227193 7 Releaser 20% diesel 1.7 1.41 3.7 4.4 0.84 Hine 1-side 227193 6 Releaser 30% diesel ND 1.4 1.81 3.7 4.4 0.84 Hine 1-side 227193 1 Releaser 30% diesel ND 1.4 1.81 3.3 0.39 Hine 1-side 227193 2 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 TIROL 3 3 2 <td></td> <td></td> <td></td> <td>310894</td> <td></td> <td>Acres 10</td> <td>ř.</td> <td>valer</td> <td>18.9</td> <td>1.37</td> <td>28.9</td> <td>6.6</td> <td>0.50</td> <td>1 7</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td></td> | | | | 310894 | | Acres 10 | ř. | valer | 18.9 | 1.37 | 28.9 | 6.6 | 0.50 | 1 7 | | • | | | | |
| Sugar Streamline 1-side 221193 FReleaser 20% diesel 169 159 159 173 32.9 Maple Streamline 1-side 221193 7 Releaser 20% diesel 1.4 1.8 1.7 1.41 3.7 4.4 0.84 3.7 Streamline 1-side 221193 6 Releaser 30% diesel ND 1.4 1.81 3.7 4.4 0.84 3.7 Streamline 1-side 221193 6 Releaser 30% diesel ND 1.4 1.81 3.3 0.39 0.1 Streamline 1-side 221193 1 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 0.1 Streamline 1-side 221193 1 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 0.1 Streamline 1-side 221193 2 Releaser 30% mineral ND 1.4 1.81 3 | NTROL 7 Notesset 5% water 16.9 16.9 31.9 6.6 0.62 3.4 Uline 1-aide 221193 5 Releaser 20% diesei 1.40 28.0 18.9 1.73 32.9 Uline 1-aide 221193 7 Releaser 20% diesei 30% diesei 1.7 1.41 3.7 4.4 0.84 Uline 1-aide 221193 6 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 Uline 1-aide 221193 6 Releaser 30% diesei ND 1.4 1.81 3.3 0.39 Uline 1-aide 221193 6 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 IIIne 1-aide 221193 2 Releaser 30% mineral ND 1.4 1.81 3.3 0.39 ITMO 3 3 3 3 <t< td=""><td></td><td></td><td></td><td>070994</td><td>, ,</td><td>T. MICH.</td><td></td><td>valer</td><td>22.5</td><td>1.71</td><td>38.5</td><td>0.7</td><td>0.23</td><td>0.2</td><td></td><td>2</td><td>_</td><td>2</td><td>0</td><td></td></t<> | | | | 070994 | , , | T. MICH. | | valer | 22.5 | 1.71 | 38.5 | 0.7 | 0.23 | 0.2 | | 2 | _ | 2 | 0 | |
| Sugar Major Streamline 1-side 221193 5 Releaser 20% diesei 1.40 28.0 1.73 32.9 4.5 6.5 4.5 | line 1-side 221193 5 Releaser 20% diesei 1.40 28.0 1,73 32.9 8.5 0.58 line 1-side 221193 7 Releaser 20% diesei 30% diesei 1,7 1,41 3,7 4,4 0.86 line 1-side 221193 6 Releaser 30% mineral ND 1,4 1,81 3,3 0,19 line 1-side 221193 6 Releaser 30% mineral ND 1,4 1,81 3,3 0,19 line 1-side 221193 2 Releaser 30% mineral ND 1,4 1,81 3,3 0,99 IND 3 2 Releaser 30% mineral ND 1,4 1,81 3,3 3,3 0,99 IND 3 3 3 0,99 0,6 0,6 2,8 0,75 IND 3 3 3 3 3 0,99 | | | | | | Actions | | vater | 18.9 | 1.69 | 31.9 | 9.6 | 0.62 | | | | _ | | | |
| Streamline 1-side 221193 7 Releaser 20% diesel 35 154 4.9 8.5 0.56 4.9 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 | Iline 1-side 221193 7 Releaser 20% Glesel 1.7 1.41 3.7 4.4 0.84 | g Lake | \vdash | | 221193 | | - Interest | | | 18.6 | 1.40 | | 0.6 | 1.73 | 32.9 | | | _ | | | |
| 227193 4 Release 30% diesei 227193 6 Release 30% diesei 227193 6 Release 30% mineral 227193 1 Release 30% diesei 227193 2 Release 30% mineral 3 3 0.99 0.89 0.8 4 0.90 0.69 0.6 0.0 0.0 5 0 0 0 0 0 0 | line 1-side 227193 4 0.84 0.84 0.84 0.84 line 1-side 227193 4 Release 30% diesei ND 1.4 1.61 3.3 0.19 line 1-side 227193 2 Release 30% mineral ND 1.4 1.61 3.3 3.3 0.99 Inte 1-side 227193 2 Release 30% mineral 0.9 0.69 0.6 2.8 0.75 ITROL 3 A No.9 1.1 0.0 0.0 0.0 | (poomus | _ | | 21193 | | | | 1 | | | - | 3.8 | 1.94 | \$ | | 3 | 1 | | | T |
| 221193 6 Release 30% diesei NO 1.4 1.81 3.3 3.13 0.59 3.3 221193 1 Release 30% diesei NO 1.4 1.81 3.3 3.3 0.59 3.3 221193 2 Release 30% mineral 0.9 0.69 0.6 2.8 0.75 2.1 3 3 4 4 1.1 0.99 0.6 0.0 0.0 0.0 | line 1-side 221193 6 Release 30% disease 30% mineral ND 1.4 1.81 3.3 0.19 line 1-side 221193 1 Release 30% diseasi 30% diseasi 28 0.75 Iline 1-side 221193 2 Release 30% mineral 0.9 0.69 0.6 28 0.75 ITROL 3 Release 30% mineral 1.1 0.89 1.1 0.0 0.0 | | - | | 221161 | | | | - | | | | 1.7 | 1.41 | 3.7 | | | . : | | | _ |
| 221193 6 Release 30% mineral ND 1.4 1.81 3.3 3.3 0.99 3.3 221193 2 Release 30% mineral 1.1 0.9 0.69 0.6 2.8 0.75 2.1 1.1 0.98 1.1 0.0 0.0 0.0 0.0 | ND 1.4 1.81 3.3 0.59 | | - | | | | Tolesse' | | 1 | | | _ | | 2.00 | _ | | | 3.7 | | | |
| 221193 2 Release 30% diesei 6 0.9 0.69 0.6 2.8 0.75 2.1 3 3 2.1 | line 1-side 221193 1 Release 30% diesei 0.9 0.69 0.6 2.8 0.75 178OL 3 172.0 5.49 39.5 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 | _ | _ | | 21183 | | Seese. | | Jeres! | - | 9 | _ | | | _ | 0.7 | 1.19 | 1.0 | | | _ |
| 221193 2 Releaser 30% mineral 0.8 0.69 0.6 | TROL 3 Release 30% mineral 6.9 0.69 0.6 1.1 0.96 1.1 0.96 1.1 0.96 1.1 | _ | - | | 21183 | - | piesse | | 1 | | | | | | 2 | 3.3 0 | | 3.3 | N | | _ |
| 11 000 13 | TROL 3 1.1 0.98 1.1 7780L 3 72.0 8.49 39.5 | _ | 60 | | 21183 | 2 8 | please | | - | | | _ | 67 | .69 | 9.0 | 2.8 0. | 37. | 1.7 | | | |
| | 72.0 6.49 39.5 | 1 | - | CONTROL | | • | , | | | | | _ | | 1.98 | 1.1 | 3.0 | 0 | 0.0 | | | _ |

i by multiplying the percentage of the ground covered by the sprouts (GRCV) by the average helpht (HT) of the stump sprouts

| | | | APPENDIX II ACTUAL & PREDICTED TREATMENT COSTS BY METHOD AND PRODUCT | PREDICTED | APP TREATME | APPENDIX II | у метно | D AND | PRODU | CT | | |
|------------|----------------------|--------|--|-----------|------------------|-------------|---------------------|----------------|-------|---------------|---------------|------------|
| | | | | | | | | | | Costs | | |
| Method | Product ¹ | Rate | Mix ² | Number | Stumps (#/ha) | Product | C | Chemical | | Labour | Total | _ |
| | | | | (#) | (milia) | (ml/stump) | (cent | (cents/tstump) | 0 | (cents/stump) | Actual | Predicted* |
| | | | | | | | Product | Mix | Total | | (cents/stump) | (\$/ha) |
| Streamline | Release® | 20% | Diesel Oil | 4 | 826 | 3.80 | 8.49 | 0.85 | 9.34 | 7.5 | 16.84 | 101 |
| 1-Side | | 30% | Diesel Oil | 9 | 868 | 5.82 | 13.01 | 0.76 | 13.77 | 7.3 | 21.07 | 126 |
| | | 30% | Mineral Oil | 2 | 920 | 6.74 | 15.06 | 2.12 | 17.18 | 7.0 | 24.18 | 145 |
| Low Volume | Weedone® | | Pre-mixed | - | 274 | 25.00 | 32.50 | 0 | 32.50 | 14.0 | 46.50 | 279 |
| Low Volume | Weedone® | | Pre-mixed | 3 | 731 | 42.12 | 54.80 | 0 | 54.80 | 15.3 | 70.10 | 421 |
| Foliar | Release | 3% | Water | 4 | 704 | 5.28 | 11.80 | 0 | 11.80 | 13.3 | 25.10 | 151 |
| | | 2% | Water | - | 419 | 7.16 | 16.00 | 0 | 16.00 | 0.11 | 27.00 | 162 |
| | Vision® | 2% | Water | 3 | 864 | 4.77 | 89.9 | 0 | 89.9 | 13.3 | 86.61 | 120 |
| | | 3% | Water | - | 438 | 7.50 | 10.50 | 0 | 10.50 | 0.61 | 29.50 | 171 |
| | | 2% | Water | - | 377 | 13.26 | 18.56 | 0 | 18.56 | 18.0 | 36.56 | 219 |
| Ground | Velpar*L | 1.5 ml | Undiluted | 2 | 1571 | 12.28 | 24.25 | 0 | 24.25 | 7.0 | 31.25 | 188 |
| | | 2.5 ml | Undiluted | - | 181 | 29.17 | 57.61 | 0 | 57.51 | 19.0 | 19.92 | 460 |
| | | | | 1 | | | 27 01 10 1-10 01 10 | | 10 76 | | | |

The 1995 chemical prices (\$/litre) used in this study are Release^a 22.35; Vision^a 14.00; Weedone^a 13.00; Velpar ^aL 19.75.

The price of mixing agents was \$0.56 /litre for diesel oil and \$1.35/litre for mineral oil.

Labour costs were based on a wage rate of \$15/hour, and productivity of work performed by Planning and Research Staff.

* Based on treating 600 stumps.